5/16/16 "The best way to predict the future is to create it." -Peter Drucker

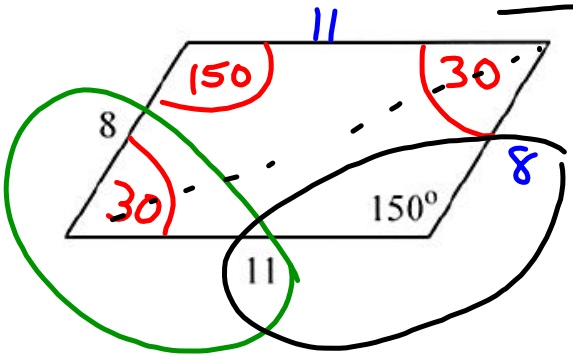
HW: "The Resultant Force" #9-23 odd

Test 2 on Friday 5/20

AIM: What is the Resultant Force?

Warm Up:

Fill in the missing angles of this parallelogram, and calculate its area.



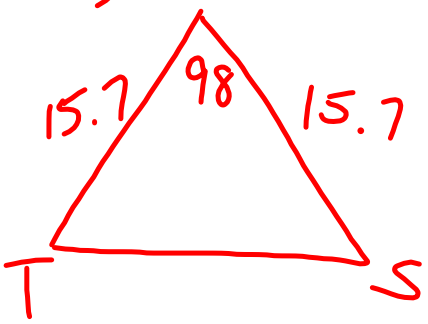
Area = $8 \cdot 11 \cdot \sin 150$

$= 8 \cdot 11 \left(\frac{1}{2}\right)$

$= 44 \text{ units}^2$

HW ✓

13) R



$A = \frac{1}{2}(15.7)(15.7)\sin 98$

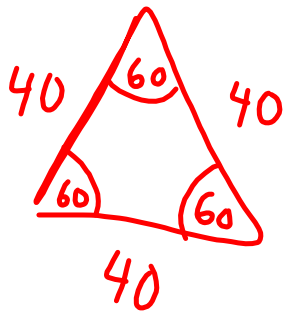
$=$

5) $\sin A = \frac{5}{6}$ $\quad$ $\text{Area} = \frac{1}{2}ab\sin C$

$\text{Area} = \frac{1}{2}(9)(16)\left(\frac{5}{6}\right)$

$= 60$

15)



$\text{Area} = \frac{1}{2}(40)(40)\sin 60$

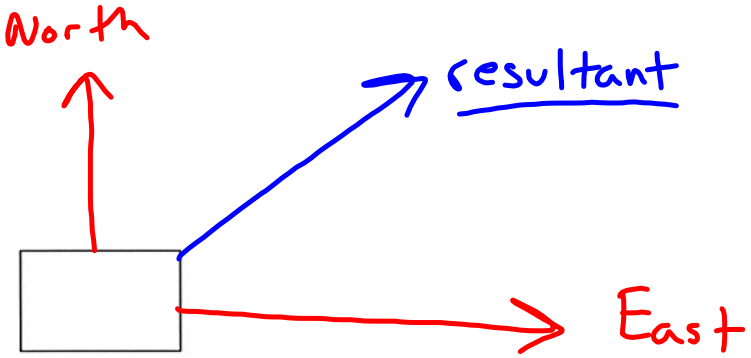
$= \frac{1}{2}(40)^2\left(\frac{\sqrt{3}}{2}\right)$

$= 800\left(\frac{\sqrt{3}}{2}\right)$ (400)

$= 400\sqrt{3}$ (1)

1) Imagine two children **pulling** on either side of a box. Here is a diagram of the forces being applied to the box…

2) Imagine that one child pulled the box **north**, whilst the other child pulled the box **east**. Draw a diagram of the forces.

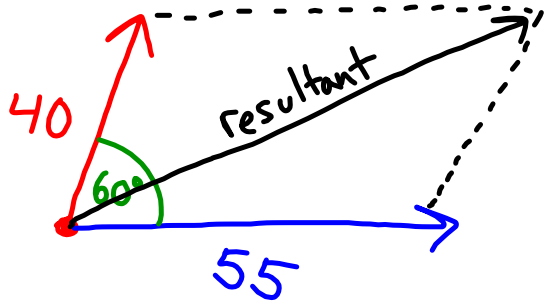


3) In which direction would the box actually move? Draw an arrow.

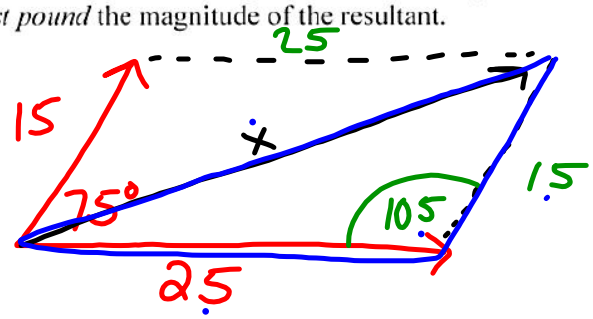
Northeast.

4) We call this the **net force**, or the **resultant force**.

5) Two forces of 40 pounds and 55 pounds act on an object. The angle between the two forces is 60°. Draw a parallelogram to model this situation, and include the resultant force.



6) Two forces of 25 and 15 pounds act on a body so that the angle between them is 75°. Find to the *nearest pound* the magnitude of the resultant.



Law of Cosines

$x^2 = 15^2 + 25^2 - 2(15)(25)\cos 105$

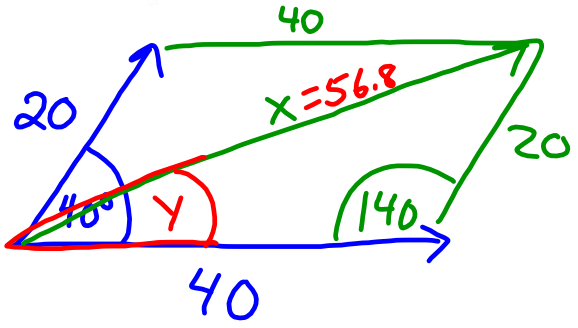
$x = \sqrt{15^2 + 25^2 - 2(15)(25)\cos 105}$

$x = 32$ pounds

7) Find to the *nearest tenth* of a pound the magnitude of the resultant force if two forces of 2.5 and 4.0 pounds act with an angle of 40° between them.

8) Two forces of 40 pounds and 20 pounds, respectively, act simultaneously on an object. The angle between the two forces is 40°.

a] Find the magnitude of the resultant, to the *nearest tenth of a pound.*



$x = \sqrt{20^2+40^2-2(20)(40)\cos(140)}$

$x = 56.8$ pounds

b] Find the measure of the angle, to the *nearest degree*, between the resultant and the larger force.

Law of sines

$\frac{56.8}{\sin 140} = \frac{20}{\sin y}$

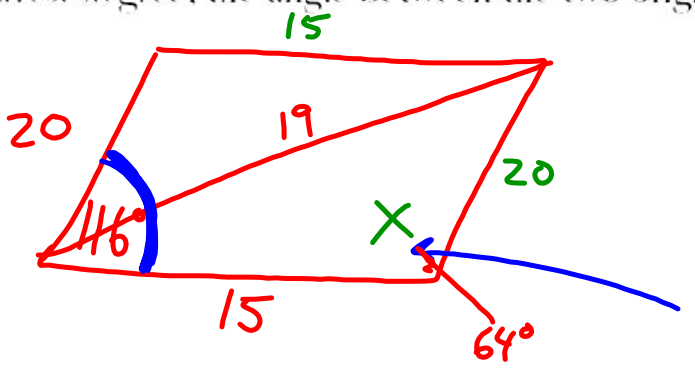
$20\sin 140 = 56.8 \sin y$

$\frac{20\sin 140}{56.8} = \sin y$

$\sin y = .226$

$\sin^{-1}(.226) = 13°$

10) One force of 20 pounds and one force of 15 pounds act on a body at the same point so that the resultant force is 19 pounds. Find, to the *nearest degree*, the angle between the two original forces.



Find the angle here then subtract it from 180

$19^2 = 15^2 + 20^2 - 2(15)(20)\cos x$

$$\frac{19^2 - 15^2 - 20^2}{-2(15)(20)} = \cos x$$

$$\frac{11}{25} = \cos x$$

$$\cos^{-1}\left(\frac{11}{25}\right) = 64°$$

$180 - 64$

$\boxed{116°}$

12) Gerardo and Bennie are pushing a box. Gerardo pushes with a force of 50 pounds in an easterly direction, and Bennie pushes with a force of 39 pounds in a northeasterly direction. The resultant force forms an angle of 32° with the 39-pound force.

a] Find the angle between the 50 pound force and the 39 pound force, to the *nearest tenth of a degree*.

b] Find the magnitude of the resultant force, to the *nearest pound*.